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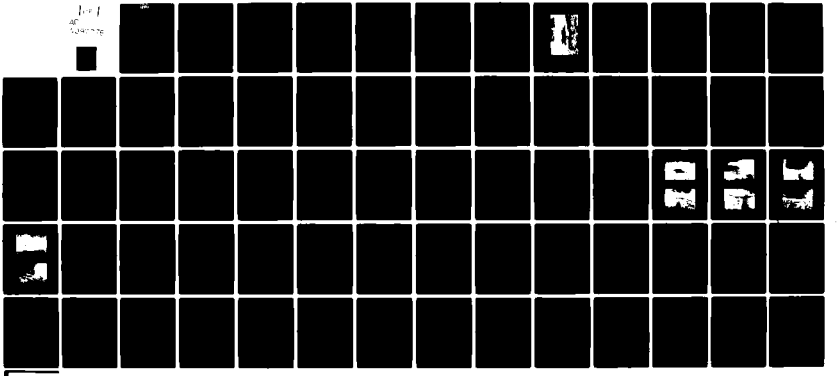

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DELAWARE RIVER BASIN

TRIBUTARY TO LACKAWAXEN RIVER, WAYNE COUNTY

PENNSYLVANIA

GLASS POND NO. 2 DAM

NDI ID NO. PA-00082
DER ID NO. 64-8

HONESDALE CONSOLIDATED WATER, COMPANY

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

Prepared by
GANNETT FLEMING CORDDRY AND CARPENTER, INC.
Consulting Engineers
Harrisburg, Pennsylvania 17105

For
DEPARTMENT OF THE ARMY
Baltimore District, Corps of Engineers
Baltimore, Maryland 21203

JANUARY 1981

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DELAWARE RIVER BASIN

TRIBUTARY TO LACKAWAXEN RIVER

WAYNE COUNTY, PENNSYLVANIA

(6) National Dam Inspection Program.

GLASS POND [redacted] Number 2 DAM

(NDI ID [redacted] Number PA-00082,
DER ID [redacted] Number 64-8)

~~HONESDALE~~ CONSOLIDATED WATER COMPANY

Delaware River Basin
Tributary to Lackawaxen River
Wayne County, Pennsylvania.

PHASE I INSPECTION REPORT,
NATIONAL DAM INSPECTION PROGRAM

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Prepared by

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Baltimore, Maryland 21203

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PREFACE

This report is prepared under guidance contained in Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigations, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I Investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the spillway design flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. The spillway design flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

GLASS POND NO. 2 DAM

NDI ID No. PA-00082, DER ID No. 64-8

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

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APPENDICES

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

BRIEF ASSESSMENT OF GENERAL CONDITION

AND

RECOMMENDED ACTION

Name of Dam:	Glass Pond No. 2 Dam NDI ID No. PA-00082 DER ID No. 64-8
Size:	Small (14 feet high; 187 acre-feet)
Hazard Classification:	High
Owner:	Honesdale Consolidated Water Company 109 Seventh St. Honesdale, PA 18431 Attn: Mr. George Williams
State Located:	Pennsylvania
County Located:	Wayne
Stream:	Tributary to Lackawaxen River
Date of Inspection:	30 October 1980

Based on the criteria established for these studies, Glass Pond No. 2 Dam is judged to be unsafe, nonemergency, because the spillway capacity is seriously inadequate. The recommended Spillway Design Flood (SDF) for the size and hazard classification of the dam varies between 1/2 of the Probable Maximum Flood (PMF) and the PMF. Based on the size of the dam and reservoir, the 1/2 PMF is selected as the SDF. The existing spillway will pass only about 7 percent of the PMF before overtopping of the dam occurs. It is judged that the dam could not withstand the depth and duration of overtopping that would occur for the 1/2 PMF. Failure of Glass Pond No. 2 Dam would cause an increased hazard for loss of life downstream.

Overall, the dam is considered to be in good condition. There are several deficiencies, all of which are considered to be minor. Maintenance of the dam and its appurtenant structures is generally adequate.

The following studies and remedial measures, listed in approximate order of priority, are recommended to be immediately undertaken by the Owner:

(1) Perform additional studies to more accurately ascertain the spillway capacity required for Glass Pond No. 2 Dam and develop alternatives to provide adequate spillway capacity. Take appropriate action as required.

(2) Repair the displaced and deteriorated sections of the spillway channel wall.

(3) Monitor the erosion along the upstream slope. Take appropriate action as required, if the condition becomes progressively worse.

(4) Develop a method for closing the outlet works at the upstream end of the dam.

All investigations, studies, designs, and construction inspection should be performed by a professional engineer experienced in the design and construction of dams.

In addition, the Owner should institute the following operational and maintenance procedures.

(1) Develop a detailed emergency operation and warning system for Glass Pond No. 2 Dam. When warnings of a major storm are given by the National Weather Service, the Owner should activate the emergency operation and warning system.

(2) Continue to provide round-the-clock surveillance of the dam during periods of unusually heavy rains.

(3) Institute an inspection program such that the dam is inspected on a regular basis. As presently required by the Commonwealth, the inspection program should include a formal annual inspection by a professional engineer experienced in the design and construction of dams. Utilize the inspection results to determine if remedial measures are necessary.

(4) Continue the current maintenance program and develop a formal maintenance manual so that all features of the dam are properly maintained.

GLASS POND NO. 2 DAM

Submitted by:

GANNETT FLEMING CORDDRY
AND CARPENTER, INC.

Frederick Futchko

FREDERICK FUTCHKO
Project Manager, Dam Section

Date: 9 February 1981

Approved by:

DEPARTMENT OF THE ARMY
BALTIMORE DISTRICT, CORPS OF
ENGINEERS

James W. Peck

JAMES W. PECK
Colonel, Corps of Engineers
District Engineer

Date: 4 MARCH 81

GLASS POND NO. 2 DAM

Overview

GLASS POND NO. 2 DAM

NDI ID No. PA-00082, DER ID No. 64-8

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

SECTION 1

PROJECT INFORMATION

1.1 General.

a. Authority. The Dam Inspection Act, Public Law 92-367, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a program of inspection of dams throughout the United States.

b. Purpose. The purpose of the inspection is to determine if the dam constitutes a hazard to human life or property.

1.2 Description of Project.

a. Dam and Appurtenances. Glass Pond No. 2 Dam is an earthfill structure with a dry stone masonry corewall which, at one time, formed the downstream face of the dam. According to photographs contained in the files of the Pennsylvania Department of Environmental Resources (PennDER) the earthen downstream slope was constructed sometime between 1917 and 1938. The dam has a crest length of approximately 100 feet, a crest width of 10 feet, and a maximum height of 14 feet. The grass covered downstream slope varies from 1V on 3H to 1V on 6H and the upstream slope averages 1V on 3H. No information is available concerning the foundation of the dam or materials used in its construction.

The outlet works consists of a 12-inch diameter cast iron pipe, the intake for which is submerged. A valve, located near the center of the embankment in a dry stone masonry chamber, controls flows through the outlet. A one-inch copper water pipe, located inside the outlet conduit, supplies water to the chlorinator building located several hundred feet downstream. The outlet conduit exits the dam through a four-foot thick masonry headwall located at the toe. The downstream channel from the headwall to Glass Pond No. 1, approximately 1,000 feet downstream, is stone lined.

The spillway, located at the right end of the dam, is a dry stone masonry channel. It is 18 feet wide by 0.4 foot deep at its entrance and narrows rapidly to 8 feet wide by 4 feet deep approximately 20 feet downstream from the entrance. The left

side of the spillway channel is vertical while the right side is sloped 1V on 2H. The spillway discharges into the stone-lined channel at the toe of the dam adjacent to the outlet pipe exit.

The various features of the dam are shown on the photographs in Appendix C and on plate E-2 in Appendix E. A description of the geology is included in Appendix F.

b. Location. Glass Pond No. 2 Dam is located on an unnamed tributary approximately 4.0 miles upstream of the Lackawaxen River and 4.5 miles northwest of the Borough of Honesdale, in Dyberry Township, Wayne County, Pennsylvania. The dam is located on USGS quadrangle Honesdale, Pennsylvania at latitude N 41° 37.4' and longitude W 75° 19.0'. A location map is shown on Plate E-1.

c. Size Classification. Small (14 feet high, 187 acre-feet).

d. Hazard Classification. Downstream conditions indicate that a high hazard classification is warranted for Glass Pond No. 2 Dam (Paragraphs 3.1e and 5.1c).

e. Ownership. Honesdale Consolidated Water Company, 109 Seventh Street, Honesdale, PA 18431, Attention: Mr. George Williams.

f. Purpose of Dam. Water supply.

g. Design and Construction History. No information is available concerning the design and construction of the original structure. The dam, constructed prior to 1914, was modified sometime between 1917 and 1938 at which time the earthen downstream slope was added.

h. Normal Operational Procedures. Normal inflows to the reservoir are discharged through the 12-inch diameter cast iron outlet pipe which is kept partially open year round. Inflows in excess of the outlet pipe capacity are discharged through the spillway. Water is drawn off through the one-inch water supply line as required. Maintenance, when deemed necessary, is performed by Water Company personnel.

1.3 Pertinent Data.

a.	Drainage Area. (square miles)	0.35
b.	Discharge at Damsite. (cfs)	
	Maximum known flood	1942-discharge unknown
	Outlet works (at pool el. 1480.4)	7
	Spillway (pool el. 1480.4)	12

c. Elevation. (feet above msl.)

Minimum Top of Dam	1480.4
Maximum Pool	1480.4
Normal Pool (Spillway Crest)	1480.0
Streambed at Toe of Dam	1467.0

d. Reservoir Length. (miles)

Normal Pool	0.55
Maximum Pool	0.56

e. Storage. (acre-feet)

Normal Pool	165
Maximum Pool	187

f. Reservoir Surface. (acres)

Normal Pool	55
Maximum Pool	56

g. Dam.

Type		Earthfill with dry stone masonry corewall.
Length (feet)		100
Height (feet)		14
Top Width (feet)		10
Side Slopes	Upstream	1V on 3H
	Downstream	1V on 3H to 1V on 6H
Zoning		Unknown
Cut-off		Unknown
Grout Curtain		Unknown
Drains		None

h. Diversion and Regulating Tunnel. None

i. Spillway.

Type		Stone masonry channel.
Length (feet)		75
Base Width at Entrance (feet)		18
Side Slopes	Left Right	Vertical 1V on 2H
Crest Elevation (feet msl.)		1480.0
Gates		None
Downstream Channel		Stone-lined to Glass Pond No. 1 (1,000 feet downstream)

j. Regulating Outlets.

Type	12-inch diameter CIP with one-inch water pipe inside.
Inlet Invert Elevation (feet msl.)	Unknown
Exit Invert Elevation (feet msl.)	1467.0 (12-inch CIP)
Closure	Gate valve in chamber at top of dam.

SECTION 2

ENGINEERING DATA

2.1 Design.

a. Data Available. No design data are available for the dam or subsequent modifications.

b. Design Features. The various features of the dam are described in Paragraph 1.2a and are shown on the photographs in Appendix C and on Plate E-2 in Appendix E.

c. Design Considerations. The design of the dam cannot be assessed from available data.

2.2 Construction.

a. Data Available. There are no construction data available for Glass Pond No. 2 Dam.

b. Construction Considerations. The construction of the dam cannot be assessed from available data.

2.3 Operation. There are no formal records of operation except reservoir pool levels which are maintained by the Water Company. Records of inspections performed by the Commonwealth are available for the period from 1917 to 1965. A summary of the inspection reports is included in Appendix A.

2.4 Evaluation.

a. Availability. Engineering data were provided by the Bureau of Dams and Waterway Management, Department of Environmental Resources, Commonwealth of Pennsylvania (PennDER). The Owner and the Owner's engineer were available for information during the visual inspection.

b. Adequacy. The type and amount of available design data and other engineering data are limited, and the assessment must, therefore, be based on the combination of available data, visual inspection, performance history, and hydrologic and hydraulic assumptions.

c. Validity. There is no reason to question the validity of the available data.

SECTION 3

VISUAL INSPECTION

3.1 Findings.

a. General. The dam and its appurtenant structures were found to be in good overall condition at the time of the inspection. Noteworthy deficiencies observed are described in the following paragraphs. The complete visual inspection checklist and field sketch are given in Appendix B. The reservoir level was 1.8 feet below the spillway crest on the date of the inspection.

b. Embankment. The crest and downstream slope of the embankment are covered with short grass. A slight vertical offset (0.3± foot) along the length of the dam crest was observed. According to the photographs of the original structure, contained in the files of PennDER, there was also an offset in the masonry corewall which probably corresponds to the observed crest irregularity.

The upstream slope of the dam averages 1V on 3H and is surfaced with dumped rock with an average size of about six inches. Some minor erosion was observed along the upstream slope at the normal pool level.

The survey performed for this inspection reveals that the low area on the embankment is only 0.4 foot above the spillway crest. The top of the dam varies in elevation by about 0.7 foot between high and low points as shown on Plate E-2, Appendix E.

c. Appurtenant Structures. The outlet works appears to be in good condition, although only the valve chamber and exit end of the outlet pipe could be observed. No sign of distress was observed at the masonry valve chamber or masonry headwall. The bottom of the chamber, which was approximately 8 feet below the pool level at the time of the inspection was dry. The Owner indicated that the valve is operable and is typically operated twice annually. There is no method of closing the outlet works at the upstream end of the dam.

One 20-foot section of the left spillway channel wall, located approximately 40 feet from the spillway entrance, is displaced inward one foot at the top of the wall. Another section of the wall, located at the crest of the dam, is deteriorated. There is some brush growing in the spillway channel.

d. Reservoir Area. Glass Pond No. 2 covers approximately 25 percent of the total watershed area. The remainder of the watershed is either woods or open fields and has no other

reservoirs or ponds within its boundaries. The hills in the area rise to a maximum height of about 150 feet above the reservoir and are gently to moderately sloping.

e. Downstream Channel. Glass Pond No. 1 is located about 1,000 feet downstream from the dam. A gravel road and a small chlorinator building represent the only development between the two reservoirs. Glass Pond No. 1 Dam is approximately 6 feet high and has a maximum storage capacity of about 90 acre-feet. Three homes are located in low-lying areas within 1,500 feet downstream of Glass Pond No. 1 Dam.

SECTION 4

OPERATIONAL PROCEDURES

4.1 Procedure. Normal inflows to the reservoir are discharged through the outlet pipe which remains partially open year-round. During wet periods excess inflows are discharged over the spillway and into the downstream channel.

4.2 Maintenance of Dam. Maintenance of the dam is adequate. It is visited daily by Water Company personnel at which time the reservoir pool level is recorded. The grass on the embankment is mowed periodically. Trees, brush, leaves and other debris are removed from the dam and spillway every spring.

4.3 Maintenance of Operating Facilities. The valve chamber and outlet conduit valve are both in fair condition. The Owner indicated that the valve is operated twice annually.

4.4 Warning Systems in Effect. There is no written emergency operation and warning system in effect. The caretaker, who lives near the dam, continually checks the condition of the dam, particularly during periods of heavy rainfall. If any problems were to develop, the Water Company would be notified immediately.

4.5 Evaluation of Operational Adequacy. The maintenance of the dam is adequate. A program of formal annual inspections is necessary to detect potentially hazardous conditions at the dam. A detailed emergency operation and warning system is necessary to reduce the risk of dam failure should adverse conditions develop and to prevent loss of life should the dam fail.

SECTION 5

HYDROLOGY AND HYDRAULICS

5.1 Evaluation of Features.

a. Design Data. No hydrologic or hydraulic design information is available for Glass Pond No. 2 Dam.

b. Experience Data. The maximum recorded flood at the site occurred in May 1942 during which the area received 10.22 inches of rainfall. The rainfall recorded on May 23 of this storm totaled 6.35 inches. The dam reportedly suffered no damage as a result of the storm. Another major storm occurred during March 10-21, 1936 which resulted in 7.46 inches of rainfall and 30 inches of snow. The reservoir rose to a maximum level of six inches above the spillway crest. No damage was reported.

c. Visual Observations.

(1) General. The visual inspection of Glass Pond No. 2 Dam which is described in Section 3 resulted in a number of observations relevant to hydrology and hydraulics.

(2) Embankment. The upstream slope of the embankment shows signs of minor erosion at the normal pool level. There is one low area on the crest of the dam near the right abutment which is only 0.4 foot above the spillway crest.

(3) Appurtenant Structures. The deteriorated masonry retaining wall on the left side of the spillway entrance channel could result in erosion of the embankment should a significant spillway discharge occur.

(4) Reservoir Area. As previously mentioned, the reservoir itself comprises about 25 percent of the watershed area. The watershed, which consists of woods and open fields, contains no other lakes or impoundments.

(5) Downstream Conditions. Glass Pond No. 1 is located approximately 1,000 feet downstream from Glass Pond No. 2 Dam. The physical characteristics and proximity of the two dams are such that failure of the No. 2 Dam could cause failure of the No. 1 Dam and subsequent flooding of two or three permanent dwellings downstream. Therefore a "high" hazard classification has been assigned to Glass Pond No. 2 Dam.

d. Overtopping Potential.

(1) Spillway Design Flood. According to the criteria established by the Office of the Chief of Engineers (OCE), the Spillway Design Flood (SDF) for the size (small) and hazard

potential (high) of Glass Pond No. 2 Dam is between the one-half Probable Maximum Flood (1/2 PMF) and the Probable Maximum Flood (PMF). Since the dam and reservoir are on the low end of the small size category, the 1/2 PMF was selected as the SDF. The watershed and reservoir were modelled with the U. S. Army Corps of Engineers' HEC-1DB computer program, a description of which is included in Appendix D. The hydrologic and hydraulic assessment of the dam is based on existing conditions; the effects of future development were not considered.

(2) Summary of Results. Pertinent results are tabulated at the end of Appendix D. The analysis reveals that Glass Pond No. 2 Dam can pass only 7 percent of the PMF before overtopping of the dam occurs.

(3) Spillway Adequacy. The criteria used to evaluate the spillway adequacy are described in Appendix D. Since the dam could not pass the 1/2 PMF and was considered to fail during a storm of only 40 percent of the PMF, a breach analysis was performed to ascertain the impact of the failure on the downstream area. The conditions contributing to failure of the dam, as well as its failure mode, are also included in Appendix D. It was found that failure of the dam during the 1/2 PMF would cause water levels at the damage area to rise about three feet above the levels that would exist if the dam were not to fail. There is, therefore, an increased hazard for loss of life; the spillway capacity of Glass Pond No. 2 Dam is, accordingly, rated seriously inadequate.

SECTION 6

STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability.

a. Visual Observations.

(1) General. The visual inspection of Glass Pond No. 2 Dam, which is described in Section 3, resulted in a number of observations relevant to structural stability. These observations are evaluated herein for the various features.

(2) Embankment. The embankment slopes are relatively flat. No seepage or signs of instability were observed. The erosion on the upstream slope does not, at this time, constitute a threat to the stability of the structure.

(3) Appurtenant Structures. The displaced left spillway wall, although an indicator of a potential stability problem, is not considered serious at this time.

b. Design and Construction Data. There are no design or construction data for the dam or appurtenant structures.

c. Operating Records. There are no formal records of operation. Based on available data, no stability problems are reported to have occurred during the operational history of the dam.

d. Post-construction Changes. The only known post-construction change was the addition of the earthen downstream slope. This type of modification generally has a favorable effect on the stability of a dam.

e. Seismic Stability. Glass Pond No. 2 Dam is located in Seismic Zone 1. Normally, it can be considered that if a dam in this zone has adequate factors of safety under static loading conditions, it can be assumed safe for any expected earthquake loading. The only concern in this case is the displaced spillway wall which, as mentioned, is a sign of potential instability. No other readily apparent conditions were observed that would indicate a stability problem during seismic loading conditions.

SECTION 7

ASSESSMENT, RECOMMENDATIONS, AND REMEDIAL MEASURES

7.1 Dam Assessment.

a. Safety.

(1) Based on available records, visual inspection, and past operational performance Glass Pond No. 2 Dam is judged to be in good condition. Considering the size and hazard classification of the dam, the recommended SDF varies from the 1/2 PMF to the PMF. Because of the size of the dam and reservoir the 1/2 PMF is selected as the SDF. It has been determined that the dam would fail during the 1/2 PMF. Failure of Glass Pond No. 2 Dam would cause an increased hazard for loss of life. Based on criteria established for these studies, the spillway capacity is rated as seriously inadequate and the facility is judged to be unsafe, nonemergency.

(2) No serious stability problems were observed at the dam or its appurtenant structures.

(3) Maintenance of the dam is generally adequate.

(4) A summary of the various features of the project and observed deficiencies is listed below:

Feature	Observed Deficiency
Embankment	Minor erosion along upstream slope at normal pool level; irregular profile.
Spillway	Displaced wall adjacent to embankment; deteriorated section of wall at embankment crest; brush.
Outlet Works	No upstream closure.

b. Adequacy of Information. The information available is such that an assessment of the condition of the dam can be determined from the combination of visual inspection, past performance, and computations performed as part of this study.

c. Urgency. The recommendations in Paragraph 7.2 should be implemented without delay.

d. Necessity for Further Investigation. Further investigations by the Owner will be required as outlined in Paragraph 7.2.

7.2 Recommendations and Remedial Measures.

a. The following studies and remedial measures, listed in approximate order of priority, are recommended to be immediately undertaken by the Owner:

(1) Perform additional studies to more accurately ascertain the spillway capacity required for Glass Pond No. 2 Dam and develop alternatives to provide adequate spillway capacity. Take appropriate action as required.

(2) Repair the displaced and deteriorated sections of the spillway channel wall.

(3) Monitor the erosion along the upstream slope. Take appropriate action, as required, if this condition becomes progressively worse.

(4) Develop a method for closing the outlet works at the upstream end of the dam.

All investigations, studies, designs, and construction inspection should be performed by a professional engineer experienced in the design and construction of dams.

b. In addition, the Owner should institute the following operational and maintenance procedures.

(1) Develop a detailed emergency operation and warning system for Glass Pond No. 2 Dam. When warnings of a major storm are given by the National Weather Service, the Owner should activate the emergency operation and warning system.

(2) Continue to provide round-the-clock surveillance of the dam during periods of unusually heavy rains.

(3) Institute an inspection program such that the dam is inspected on a regular basis. As presently required by the Commonwealth, the inspection program should include a formal annual inspection by a professional engineer experienced in the design and construction of dams. Utilize the inspection results to determine if remedial measures are necessary.

(4) Continue the current maintenance program and develop a formal maintenance manual so that all features of the dam are properly maintained.

APPENDIX A

CHECKLIST - ENGINEERING DATA

CHECKLIST

ENGINEERING DATA

DESIGN, CONSTRUCTION, AND OPERATION
PHASE I

NAME OF DAM: Glass Pond No. 2 Dam

NDI ID NO.: PA-00082 DER ID NO.: 64-8

Sheet 1 of 4

ITEM	REMARKS
AS-BUILT DRAWINGS	None Available
REGIONAL VICINITY MAP	See Plate E-1 (Appendix E)
CONSTRUCTION HISTORY	Not Available
TYPICAL SECTIONS OF DAM	See Plate E-2 (Appendix E)
OUTLETS: Plan Details Constraints Discharge Ratings	Discharge rating is included in appendix D; no other detailed information is available.

ENGINEERING DATA

ITEM	REMARKS
RAINFALL/RESERVOIR RECORDS	Records are maintained by the Honesdale Water Company.
DESIGN REPORTS	"Report Upon the Glass Pond No. 2 Dam" prepared by the Commonwealth May 18, 1917 gives a description of the original structure.
GEOLOGY REPORTS	see Appendix F
DESIGN COMPUTATIONS: Hydrology and Hydraulics Dam Stability Seepage Studies	None
MATERIALS INVESTIGATIONS: Boring Records Laboratory Field	None
POSTCONSTRUCTION SURVEYS OF DAM	None

ENGINEERING DATA

ITEM	REMARKS
BORROW SOURCES	Unknown
MONITORING SYSTEMS	None
MODIFICATIONS	Embankment modifications performed between 1917 and 1938; no other information is available.
HIGH POOL RECORDS	Pool records are maintained by the Honesdale Water Company.
POSTCONSTRUCTION ENGINEERING STUDIES AND REPORTS	None
PRIOR ACCIDENTS OR FAILURE OF DAM: Description Reports	None

ENGINEERING DATA

ITEM	REMARKS
MAINTENANCE AND OPERATION RECORDS	None
SPILLWAY: Plan Sections Details	See Exhibit B-1 (Appendix B)
OPERATING EQUIPMENT: Plans Details	None
PREVIOUS INSPECTIONS Dates Deficiencies	1965 - General appearance OK 1938 - Several small streams emerging from the left channel wall at its point of intersection with the waste channel paving. 1930 - Good condition.

APPENDIX B

CHECKLIST - VISUAL INSPECTION

CHECKLIST

VISUAL INSPECTION

PHASE I

Name of Dam: Glass Pond No. 2 Dam County: Wayne State: Pennsylvania

NDI ID No.: PA-00082 DER ID No.: 64-8

Type of Dam: Earthfill with stone masonry corewall Hazard Category: High

Date(s) Inspection: 30 October 1980 Weather: Overcast, Windy Temperature: 40°F

Pool Elevation at Time of Inspection: 1478.2 ft. msl/Tailwater at Time of Inspection: 1467.0 ft. msl

Inspection Personnel:

W. B. Bingham (GFCC)
R. E. Holderbaum (GFCC)
D. R. Ebersole (GFCC)
G. Williams (Honesdale Water Company)
C. Dennis (Hess Engineering)

R. E. Holderbaum Recorder

B-1

EMBANKMENT

Sheet 1 of 2

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	None observed	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	None observed	
SLOUGHING OR EROSION: Embankment Slopes Abutment Slopes	Minor erosion along upstream slope at normal water level.	should be monitored during future inspections.
CREST ALIGNMENT: Vertical Horizontal	slight vertical offset along crest of dam.	May correspond to vertical offset in masonry corewall.
RIPRAP FAILURES	slight erosion of slope just above riprap.	

EMBANKMENT

Sheet 2 of 2

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
JUNCTION OF EMBANKMENT WITH: Abutment Spillway Other Features	Spillway wall at junction of embankment is displaced.	See Sheet B-5 (UNGATED SPILLWAY)
ANY NOTICEABLE SEEPAGE	None	Seepage observed during December 1938 inspection through left spillway wall at toe of dam; Reservoir level 1" ± above spillway crest.
STAFF GAGE AND RECORDER	None	
DRAINS	None	

OUTLET WORKS

Sheet 1 of 1

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	Exit end of cast iron outlet pipe is in fair condition.	
INTAKE STRUCTURE	Submerged	Intake is located approx. 200 feet upstream from dam.
OUTLET STRUCTURE	Four-ft. thick dry stone masonry headwall - good condition.	
OUTLET CHANNEL	No obstructions.	Channel is stone-lined 1000 feet downstream to Glass Pond No. 1.
EMERGENCY GATE	Gate valve located in masonry valve chamber near crest of dam.	Valve is reportedly operated twice annually.

UNGATED SPILLWAY

Sheet 1 of 1

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	Stones placed on end form spillway crest; Masonry wall on left side of spillway crest is deteriorated.	Masonry wall should be reconstructed.
APPROACH CHANNEL	Lake; unobstructed.	
DISCHARGE CHANNEL	Top of 20-ft. section of wall is displaced inward 1 foot ± located 40 feet from spillway entrance; some brush in channel.	Wall should be reconstructed; brush and leaves are removed every spring.
BRIDGE AND PIERS	None	

INSTRUMENTATION

Sheet 1 of 1

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
MONUMENTATION/SURVEYS	None	
OBSERVATION WELLS	None	
WEIRS	None	
PIEZOMETERS	None	
OTHER		

RESERVOIR AND WATERSHED

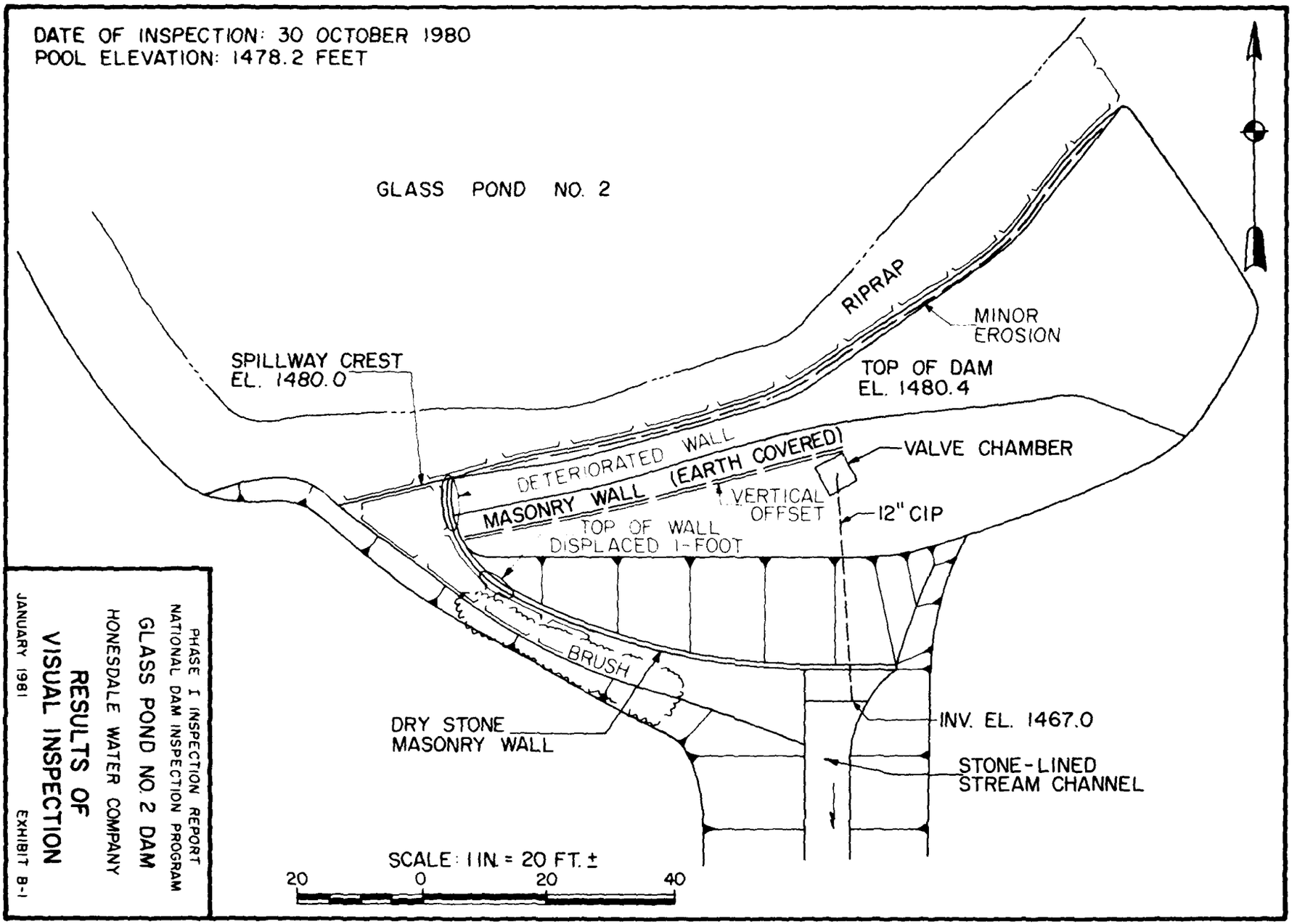
Sheet 1 of 1

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	Moderate; wooded.	
SEDIMENTATION	Unknown	Probably minor considering watershed characteristics.
WATERSHED DESCRIPTION	Lake surface covers approx. 25 percent of the watershed; the remainder consists of farmland and wooded areas	No other reservoirs or lakes are located in the watershed.

DOWNSTREAM CHANNEL

Sheet 1 of 1

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION: Obstructions Debris Other	stream valley between the dam and Glass Pond No. 1 is wooded; the valley below Glass Pond No. 1 is open.	
SLOPES	Fairly steep between the dam and the damage area.	
APPROXIMATE NUMBER OF HOMES AND POPULATION	Glass Pond No. 1 is located 1000 feet downstream; three homes are located just downstream from Glass Pond	
	No. 1 in low lying areas.	

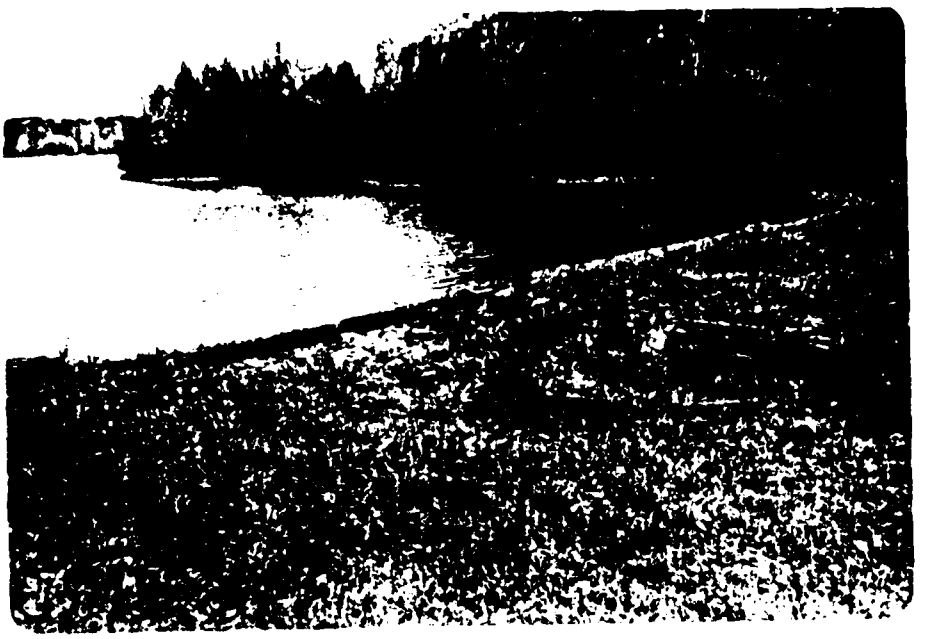

DATE OF INSPECTION: 30 OCTOBER 1980
POOL ELEVATION: 1478.2 FEET
GLASS POND NO. 2
RIPRAP
MINOR EROSION
SPILLWAY CREST EL. 1480.0
TOP OF DAM EL. 1480.4
DETERIORATED WALL
MASONRY WALL (EARTH COVERED)
VALVE CHAMBER
VERTICAL OFFSET
12" CIP
TOP OF WALL DISPLACED 1-FOOT
BRUSH
DRY STONE MASONRY WALL
INV. EL. 1467.0
STONE-LINED STREAM CHANNEL
SCALE: 1 IN. = 20 FT. ±
20 0 20 40
PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM
GLASS POND NO. 2 DAM
HONESDALE WATER COMPANY
RESULTS OF VISUAL INSPECTION
JANUARY 1981
EXHIBIT B-1

APPENDIX C

PHOTOGRAPHS

A. Embankment - Looking Toward Right Abutment

B. Upstream Slope - Looking Toward Left Abutment



C. Spillway Entrance

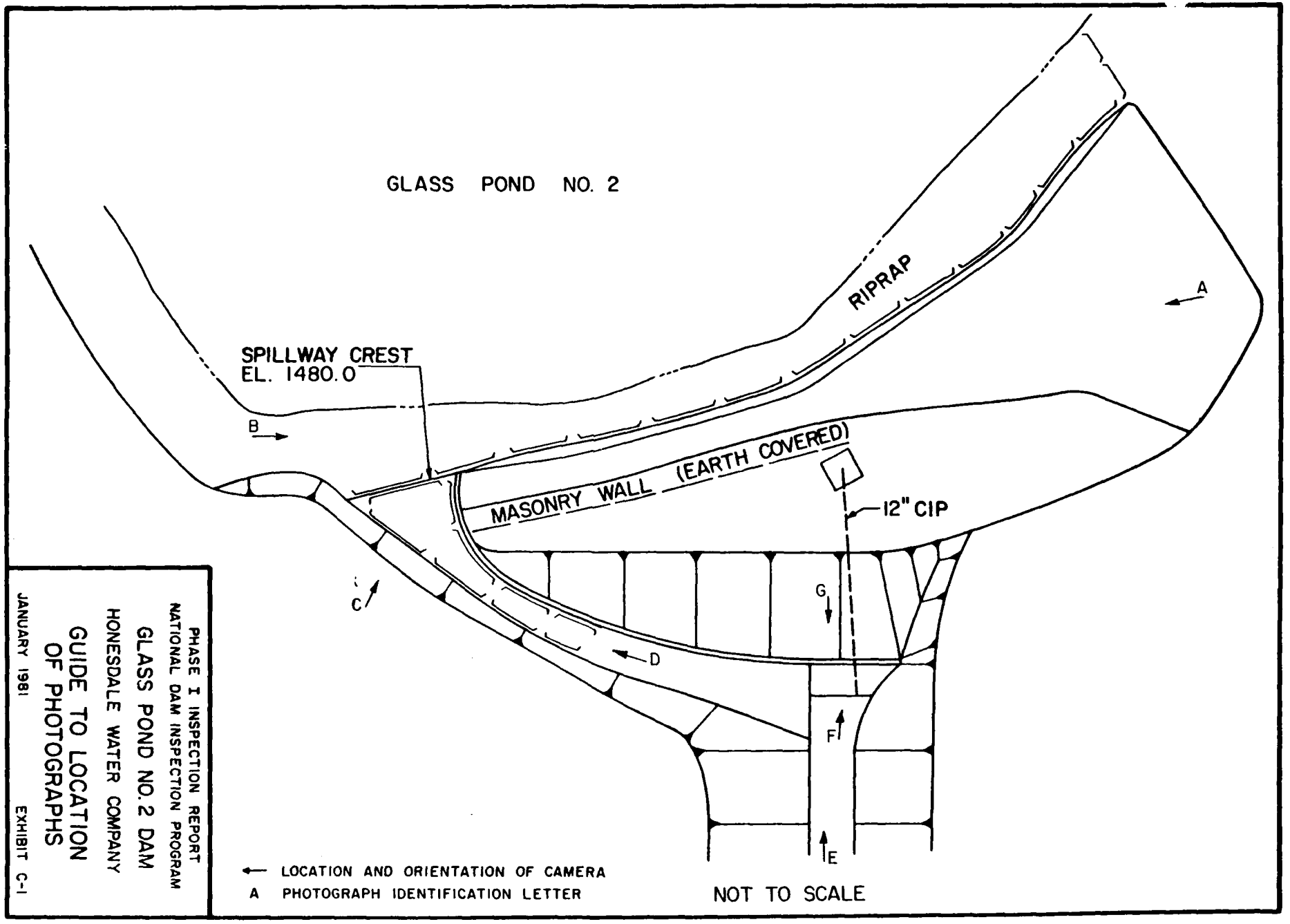
D. Spillway Channel - Looking Upstream

E. Downstream View of Dam

F. Outlet Structure and Discharge Channel

G. Downstream Channel

H. Glass Pond No. 1 Dam



PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

GLASS POND NO. 2 DAM

HONESDALE WATER COMPANY

GUIDE TO LOCATION OF PHOTOGRAPHS

JANUARY 1981

EXHIBIT C-1

APPENDIX D

HYDROLOGY AND HYDRAULICS

APPENDIX D

HYDROLOGY AND HYDRAULICS

Spillway Capacity Rating:

In the recommended Guidelines for Safety Inspection of Dams, the Department of the Army, Office of the Chief of Engineers (OCE), established criteria for rating the capacity of spillways. The recommended Spillway Design Flood (SDF) for the size (small, intermediate, or large) and hazard potential (low, significant, or high) classification of a dam is selected in accordance with the criteria. The SDF for those dams in the high hazard category varies between one-half of the Probable Maximum Flood (PMF) and the PMF. If the dam and spillway are not capable of passing the SDF without overtopping failure, the spillway capacity is rated as inadequate. If the dam and spillway are capable of passing one-half of the PMF without overtopping failure, or if the dam is not in the high hazard category, the spillway capacity is not rated as seriously inadequate. A spillway capacity is rated as seriously inadequate if all of the following conditions exist:

(a) There is a high hazard to loss of life from large flows downstream of the dam.

(b) Dam failure resulting from overtopping would significantly increase the hazard to loss of life downstream from the dam from that which would exist just before overtopping failure.

(c) The dam and spillway are not capable of passing one-half of the PMF without overtopping failure.

Description of Model:

If the Owner has not developed a PMF for the dam, the watershed is modeled with the HEC-1DB computer program, which was developed by the U.S. Army Corps of Engineers. The HEC-1DB computer program calculates a PMF runoff hydrograph (and percentages thereof) and routes the flows through both reservoirs and stream sections. In addition, it has the capability to simulate an overtopping dam failure. By modifying the rainfall criteria, it is also possible to model the 100-year flood with the program.

APPENDIX D

DELAWARE River Basin
Name of Stream: TRIBUTARY TO LACKAWAXEN RIVER
Name of Dam: GLASS POND NO. 2 DAM
NDI ID No.: PA-00082
DER ID No.: 64-8
Latitude: N 41° 37.4' Longitude: W 75° 19.0'
Top of Dam Elevation: 1480.4 FEET (MINIMUM)
Streambed Elevation: 1467 FEET Height of Dam: 14 ft
Reservoir Storage at Top of Dam Elevation: 187 acre-ft
Size Category: SMALL
Hazard Category: HIGH (see Section 5)
Spillway Design Flood: 1/2 PMF (SEE SECTION 5)

UPSTREAM DAMS - NONE

Name	Distance from Dam (miles)	Height (ft)	Storage at top of Dam Elevation (acre-ft)	Remarks

DOWNSTREAM DAMS

Name	Distance from Dam (miles)	Height (ft)	Storage at top of Dam Elevation (acre-ft)	Remarks
GLASS POND NO.1	0.50*	7±	90	DER ID 64-7

* DISTANCE TO UPSTREAM END OF RESERVOIR ≈ 1000 FEET

DELAWARE River Basin

Name of Stream: TRIB. TO LACKAWAXEN RIVER

Name of Dam: GLASS POND NO. 2 DAM

DETERMINATION OF PMF RAINFALL & UNIT HYDROGRAPH

UNIT HYDROGRAPH DATA:

Sub-area	Drainage Area (square miles)	Cp (1)	Ct (2)	L miles (3)	L_{ca} miles (4)	L' miles (5)	Tp hours (6)	Map Area (7)	Plate (8)
A-1	0.35	0.45	1.23	N/A	N/A	0.43	0.74	1	A
Total	0.35								

(See Sketch on Sheet D-4)

(1) & (2): Snyder Unit Hydrograph coefficients supplied by Baltimore District, Corps of Engineers on maps and plates referenced in (7) & (8)

The following are measured from the outlet of the subarea:

(3): Length of main watercourse extended to divide

(4): Length of main watercourse to the centroid

The following is measured from the upstream end of the reservoir at normal pool:

(5): Length of main watercourse extended to divide

(6): $Tp=C_t \times (L \times L_{ca})^{0.3}$, except where the centroid of the subarea is located in the reservoir. Then $Tp=C_t \times (L')^{0.6}$

Initial flow is assumed at 1.5 cfs/sq. mile

Computer Data: QRCSN = -0.05 (5% of peak flow)
RTIOR = 2.0

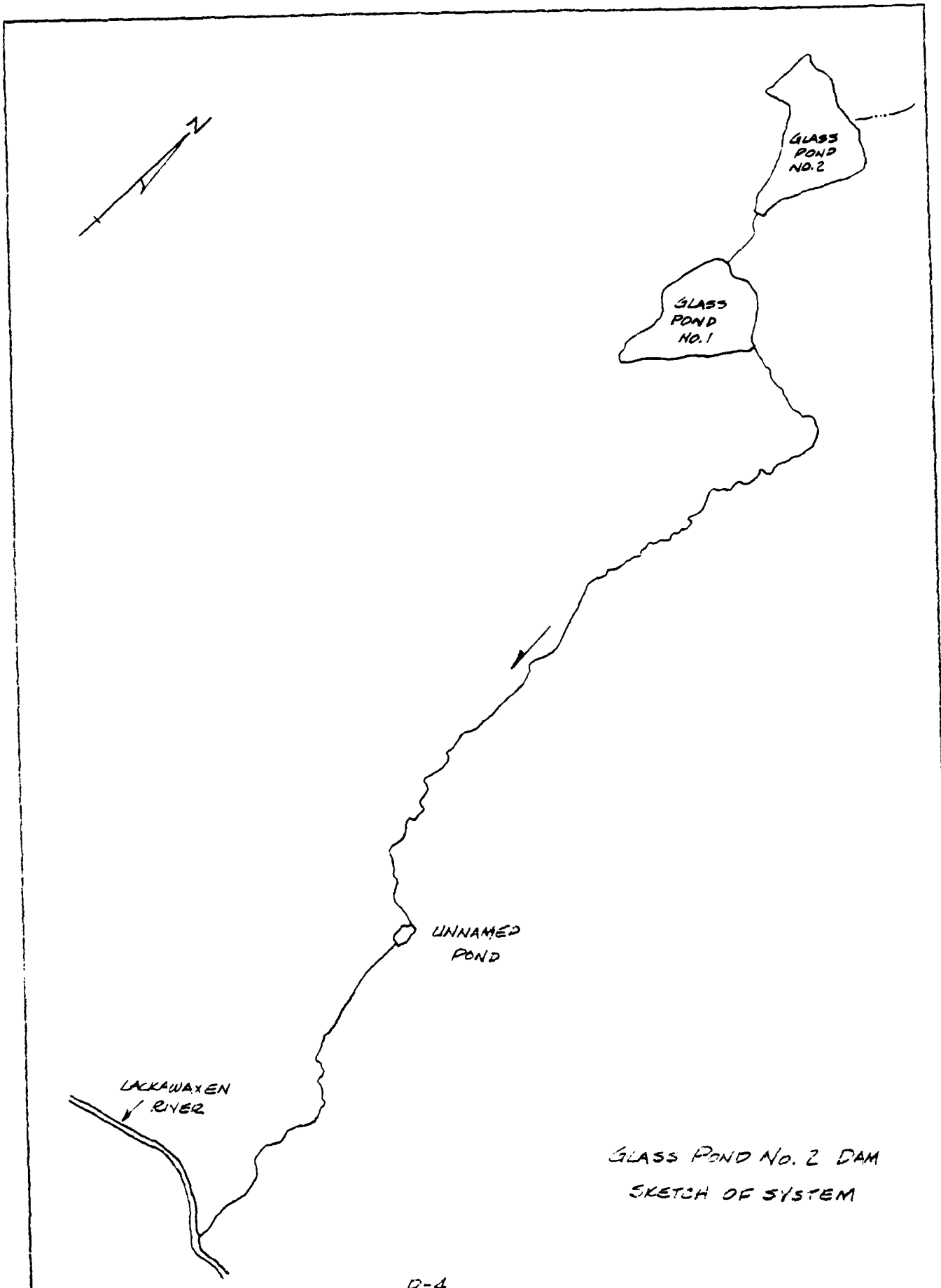
RAINFALL DATA:

PMF Rainfall Index= 21.2 in., 24 hr., 200 sq. mile

	Hydromet. 40 (Susquehanna Basin)	Hydromet. 33 (Other Basins)
Zone:	N/A	1
Geographic Adjustment Factor:		1.0
Revised Index Rainfall:		21.2

RAINFALL DISTRIBUTION (percent)

Time	Percent
6 hours	111
12 hours	123
24 hours	133
48 hours	142
72 hours	
96 hours	



GLASS POND NO. 2 DAM
SKETCH OF SYSTEM

Data for Dam at Outlet of Subarea A-1

Name of Dam: GLASS POND NO. 2 DAM

SPILLWAY DATA:	Existing Conditions	Design Conditions
		(N/A)
Top of Dam Elevation	1480.4	
Spillway Crest Elevation	1480.0	
Spillway Head Available (ft)	0.4	
Type Spillway	STONE-LINED CHANNEL	
"C" Value - Spillway	2.7	
Crest Length - Spillway (ft)	18	
Spillway Peak Discharge (cfs)	12	
Auxiliary Spillway Crest Elev.		
Auxiliary Spill. Head Avail. (ft)		
Type Auxiliary Spillway		
"C" Value - Auxiliary Spill. (ft)	N/A	
Crest Length - Auxil. Spill. (ft)		
Auxiliary Spillway Peak Discharge (cfs)		
Combined Spillway Discharge (cfs)		

Spillway Rating Curve: $Q = CLH^{1.5} = 48.6H^{1.5}$

Elevation	Q Spillway (cfs)	Q Auxiliary Spillway (cfs)	Combined (cfs)

OUTLET WORKS RATING:	Outlet 1	Outlet 2	Outlet 3
		(N/A)	(N/A)
Invert of Outlet	1467.0 ET.		
Invert of Inlet	UNKNOWN		
Type	CIP		
Diameter (ft) = D	1.0		
Length (ft) = L	~200		
Area (sq. ft) = A	0.785		
N	0.015		
K Entrance	0.5		
K Exit	1.0		
K Friction $=29.1N^2L/R^{4/3}$	8.3		
Sum of K	9.8		
$(1/K)^{0.5} = C$	0.32		
Maximum Head (ft) = HM	13		
$Q = CA\sqrt{2g(HM)}$ (cfs)	~7		
Q Combined (cfs)	—		

Data for Dam at Outlet of Subarea A-1 (See sketch on Sheet D-4)

Name of Dam: GLASS POND NO. 2 DAM

STORAGE DATA:

Elevation		Area (acres)		Storage million gals	acre-ft		Remarks
1471	=ELEVO*	0		0	0		UPSTREAM TOE
1480	=ELEV1	55.1	=A1	53.8	165	=S1	NORMAL POOL
1500 **		90.9					

* ELEVO = ELEV1 - $(3S_1/A_1)$

** Planimetered contour at least 10 feet above top of dam

Reservoir Area at Normal Pool is 25 percent of subarea watershed.

BREACH DATA: ALSO SEE SHEET D-9

See Appendix B for sections and existing profile of the dam.

Soil Type from Visual Inspection: CLAY & SILT

Maximum Permissible Velocity (Plate 28, EM 1110-2-1601) 4.6 fps
(from $Q = CLH^{3/2} = V \cdot A$ and depth = (2/3) x H) & A = L·depth

HMAX = $(4/9\ V^2/C^2)$ = 1.0 ft., C = 3.1 Top of Dam El.= 1480.4

HMAX + Top of Dam El. = 1481.4 = FAILEL
(Above is elevation at which failure would start)

Dam Breach Data:

BRWID = 25 ft (width of bottom of breach)
Z = 0.5 (side slopes of breach)
ELBM = 1471.0 (bottom of breach elevation, minimum of zero storage elevation)
WSEL = 1480.0 (normal pool elevation)
T FAIL= 60 mins = 1.0 hrs (time for breach to develop)

Data for Dam at Outlet of Subarea _____

Name of Dam: GLASS POND NO. 1 DAM

SPILLWAY DATA:

	Existing Conditions	Design Conditions
		(N/A)
Top of Dam Elevation	1426.5	
Spillway Crest Elevation	1426.0	
Spillway Head Available (ft)	0.5	
Type Spillway	OPEN CHANNEL	
"C" Value - Spillway	2.7	
Crest Length - Spillway (ft)	10 ±	
Spillway Peak Discharge (cfs)	10	
Auxiliary Spillway Crest Elev.		
Auxiliary Spill. Head Avail. (ft)		
Type Auxiliary Spillway		
"C" Value - Auxiliary Spill. (ft)	N/A	
Crest Length - Auxil. Spill. (ft)		
Auxiliary Spillway Peak Discharge (cfs)		
Combined Spillway Discharge (cfs)		

Spillway Rating Curve: $Q = CLH^{1.5} = 2.7(10)H^{1.5}$

Elevation	Q Spillway (cfs)	Q Auxiliary Spillway (cfs)	Combined (cfs)

OUTLET WORKS RATING:

	Outlet 1	Outlet 2	Outlet 3
Invert of Outlet			
Invert of Inlet			
Type			
Diameter (ft) = D			
Length (ft) = L			
Area (sq. ft) = A			
N			
K Entrance	N/A		
K Exit			
K Friction = $29.1 N^2 L/R^{4/3}$			
Sum of K			
$(1/K)^{0.5} = C$			
Maximum Head (ft) = HM			
$Q = CA\sqrt{2g(HM)}$ (cfs)			
Q Combined (cfs)			

Data for Dam at Outlet of Subarea_____(See sketch on Sheet D-4)

Name of Dam: GLASS POND NO. 1 DAM

STORAGE DATA:

Elevation		Area (acres)		Storage million gals	acre-ft		Remarks
1420	=ELEVO*	0		0	0		UPSTREAM TOE
1426	=ELEV1	36	=A1	23	72	=S1	NORMAL POOL
1440 **		59					

* ELEVO = ELEV1 - $(3S_1/A_1)$
** Planimetered contour at least 10 feet above top of dam

Reservoir Area at Normal Pool is_____percent of subarea watershed.

BREACH DATA: ALSO SEE SHEET D-9

See Appendix B for sections and existing profile of the dam.

Soil Type from Visual Inspection: CLAY & SILT

Maximum Permissible Velocity (Plate 28, EM 1110-2-1601) 4.6 fps
(from $Q = CLH^{3/2} = V \cdot A$ and depth = (2/3) x H) & A = L·depth

HMAX = $(4/9\ V^2/C^2)$ = 1.0 ft., C = 3.1 Top of Dam El.=1426.5

HMAX + Top of Dam El. = 1427.5 FEET = FAILEL
(Above is elevation at which failure would start)

Dam Breach Data:

BRWID = 20 ft (width of bottom of breach)
Z = 0.5 (side slopes of breach)
ELBM = 1420.0 (bottom of breach elevation, minimum of zero storage elevation)
WSEL = 1426.0 (normal pool elevation)
T FAIL= 60 mins = 1.0 hrs (time for breach to develop)

BY REH DATE 12/29/80 SUBJECT GLASS POND NO. 2 DAM SHEET NO ____ OF ____
CHKD BY ____ DATE ____ JOB NO ____

BREACH ASSUMPTIONS

The following assumptions apply to both Glass Pond No. 1 and No. 2 Dams.

1. One foot of overtopping was assumed to occur before failure began. This corresponds to a critical flow velocity of 4.6 feet per second.

2. The breach was assumed to develop until it reached the elevation of the upstream toe of the dam. (the bottom of the reservoir)

3. The breach parameters were chosen according to the following recommended guidelines for earth dams.

$$H/2 \leq BRWID \leq 3H \quad \text{where } H = \text{height of dam}$$

$$0 \leq Z \leq 1$$

$$0.5 \leq TFAIL \leq 4$$

4. The flood was routed directly from Dam No. 2 to Dam No. 1 since there is very little storage capacity in the stream channel between them. After routing through Dam No. 1 the flood was routed downstream to the damage center.

SELECTED COMPUTER OUTPUT

```
**********
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
  LAST MODIFICATION  01 APR 80
**********
    1                 A1                        NATIONAL DAM INSPECTION PROGRAM
    2                 A2                  BALTIMORE DISTRICT CORPS OF ENGINEERS
    3                 A3                           GLASS POND NO 2 DAM
    4                 B     300       0       15        0        0        0        0        0       -4        0
    5                 B1      5
    6                 J       1       6        1
    7                 J1    1.0     0.5      0.3      0.2      0.1     0.05
    8                 K       0       1                                          1
    9                 K1          INFLOW TO GLASS POND NO 2
   10                 M       1       1     0.35                0.35                                  1
   11                 P       0    21.2      111      123      133      142
   12                 T                                                        1.0     0.05                0.25
   13                 W    0.74    0.45
   14                 X    -1.5   -0.05      2.0
   15                 K       1       1                                          1
   16                 K1          ROUTE THROUGH GLASS POND NO 2
   17                 Y                                 1        0
   18                 Y1      1                                               -1480        0
   19                 SA      0    55.1     90.9
   20                 SE   1471    1480     1500
   21                 SS   1480      18      2.7      1.5
   22                 SD1480.4
   23                 SL      0      20      115      182      192      202
   24                 SV1480.4  1480.7  1481.0  1481.5  1482.0  1482.5
   25                 K      99
```

II-D

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS RATIO 1 1.00	RATIO 2 .50	RATIO 3 .30	RATIO 4 .20	RATIO 5 .10	RATIO 6 .05
HYDROGRAPH AT	1	.35	1	1141.	571.	342.	228.	114.	57.
	(	.91)	(	32.31)(	16.16)(	9.69)(	6.46)(	3.23)(	1.62)(
ROUTED TO	1	.35	1	927.	397.	183.	84.	22.	8.
	(	.91)	(	26.26)(	11.24)(	5.19)(	2.37)(	.62)(	.23)(

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1480.00	1480.00	1480.40
STORAGE	165.	165.	187.
OUTFLOW	0.	0.	12.

RATIO OF PMF	MAXIMUM RESERVOIR W.S. ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	148..18	1.78	289.	927.	32.25	41.00	0.00
.50	1481.60	1.20	255.	397.	26.25	41.50	0.00
.30	1481.25	.85	235.	183.	23.50	42.25	0.00
.20	1480.99	.59	221.	84.	21.00	43.00	0.00
.10	1480.57	.17	197.	22.	12.25	43.75	0.00
.05	1480.30	0.00	182.	8.	0.00	44.00	0.00

D-13

Overtopping Summary

```
**********************************
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
  L  I MODIFICATION  01 APR 80
**********************************
    1                A1                    NATIONAL DAM INSPECTION PROGRAM
    2                A2                BALTIMORE DISTRICT CORPS OF ENGINEERS
    3                A3                        GLASS POND NO 2 DAM
    4                B     300       0       15       0       0       0       0       0      -4       0
    5                B1      5
    6                J       2       1        1
    7                J1    0.5
    8                K       0       1                                               1
    9                K1        INFLOW TO GLASS POND NO 2
   10                H       1       1    0.35               0.35                                    1
   11                P       0    21.2     111      123      133      142
   12                T                                                        1.0    0.05            0.25
   13                W    0.74    0.45
   14                X    -1.5   -0.05     2.0
   15                K       1       1                                               1
   16                K1        ROUTE THROUGH GLASS POND NO 2
   17                Y                                       1       1
   18                Y1      1                                                   -1480       0
   19                SA      0    55.1    90.9
   20                SE   1471    1480    1500
   21                SS   1480      18     2.7      1.5
   22                SD1480.4
   23                SL      0      20     115      182      192      202
   24                SV1480.4  1480.7  1481.0   1481.5   1482.0   1482.5
   25                SB     25     0.5    1471      1.0   1480.0   1483.0
   26                SB     25     0.5    1471      1.0   1480.0   1481.4
   27                K       1       2                                               1
   28                K1        ROUTE THROUGH GLASS POND NO 1 DAM
   29                Y                                       1       1
   30                Y1      1                                                   -1426       0
   31                SA      0      36      59
   32                SE   1420    1426    1440
   33                SS   1426      10     2.7      1.5
   34                SD1426.5     2.5     1.5      100
   35                SB     20     0.5    1420      1.0   1426.0   1435.0
   36                SB     20     0.5    1420      1.0   1426.0   1427.5
   37                K       1       3                                               1
   38                K1        STREAM REACH 1
   39                Y                                       1       1
   40                Y1      1                                                      -1
   41                Y6    0.1    0.05     0.1     1350     1370     1100   0.064
   42                Y7      0    1380     400     1360      580     1352     580    1350     585    1350
   43                Y7    585    1352     700     1360      950     1380
   44                K      99
```

D-4

SUMMARY OF DAM SAFETY ANALYSIS

Glass Pond No. 2 Dam

PLAN 1 ••••••••••••••

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1480.00	1480.00	1480.40
STORAGE	165.	165.	187.
OUTFLOW	0.	0.	12.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.50	1481.60	1.20	255.	397.	26.25	41.50	0.00

PLAN 2 ••••••••••••••

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1480.00	1480.00	1480.40
STORAGE	165.	165.	187.
OUTFLOW	0.	0.	12.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.50	1481.49	1.09	249.	2644.	4.79	41.50	40.50

S1-0

Dam Breach Summary

SUMMARY OF DAM SAFETY ANALYSIS

Glass Pond No. 1 Dam

PLAN 1 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1426.00	1426.00	1426.50
STORAGE	72.	72.	90.
OUTFLOW	0.	0.	10.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.50	1427.53	1.03	129.	311.	33.25	43.00	0.00

PLAN 2 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1426.00	1426.00	1426.50
STOPAGE	72.	72.	90.
OUTFLOW	0.	0.	10.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.50	1429.14	2.64	192.	2804.	3.25	42.25	41.25

PLAN 1 STATION 3

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.50	311.	1353.3	43.00

PLAN 2 STATION 3

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.50	2738.	1356.3	42.25

Dam Breach and Channel Routing Summary

BY _____ DATE _____ SUBJECT _____ SHEET NO _____ OF _____

CHKD BY _____ DATE _____ JOB NO _____

GLASS POND NO. 2 DAM

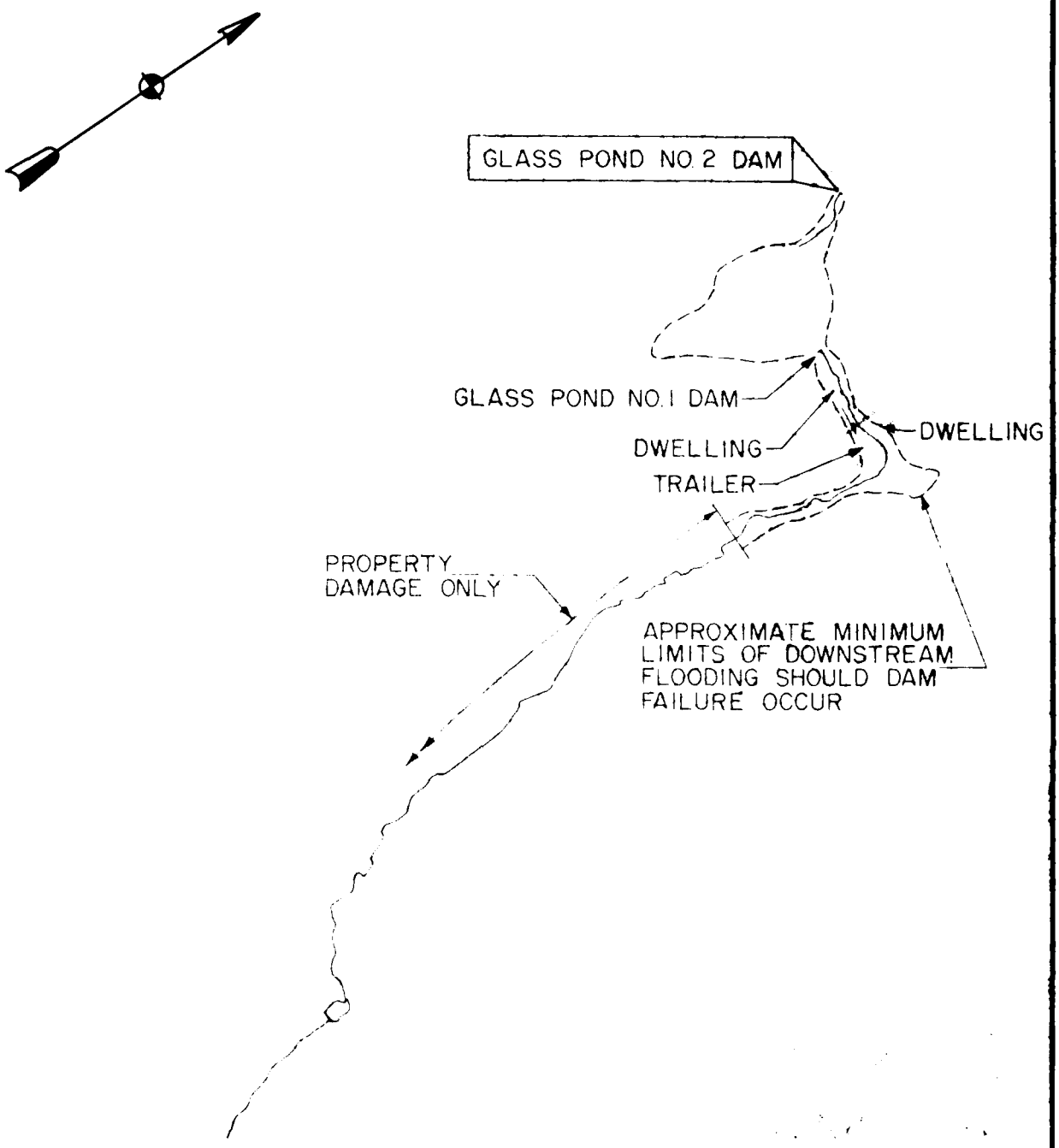
Summary of Pertinent Results

Multi-ratio Analysis:

	PMF	½ PMF
Rainfall (inches)	24.08	—
Runoff (inches)	22.29	11.14
Peak Inflow (cfs)	1141	571
Peak Outflow (cfs)	942	406
Depth of Overtopping (ft.)	1.72	1.17
Duration of Overtopping (hr.)	32.25	26.00

Breach and Routing Analysis: (½ PMF)

	No failure	Failure	Difference
Peak Outflow (cfs)	406	2634	2228
Stream Depth at Damage Center (ft.)	3.4	6.3	2.9



2000 0 2000

SCALE: 1 IN. = 2000 FT.

NOTES:

1. LIMITS OF DOWNSTREAM FLOODING ARE ESTIMATES BASED ON VISUAL OBSERVATIONS.
2. CIRCLED NUMBERS INDICATE STATIONS USED IN COMPUTER ANALYSIS.
3. THIS MAP SHOULD NOT BE USED IN CONNECTION WITH THE EMERGENCY OPERATION AND WARNING PLAN.

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

GLASS POND NO. 2 DAM

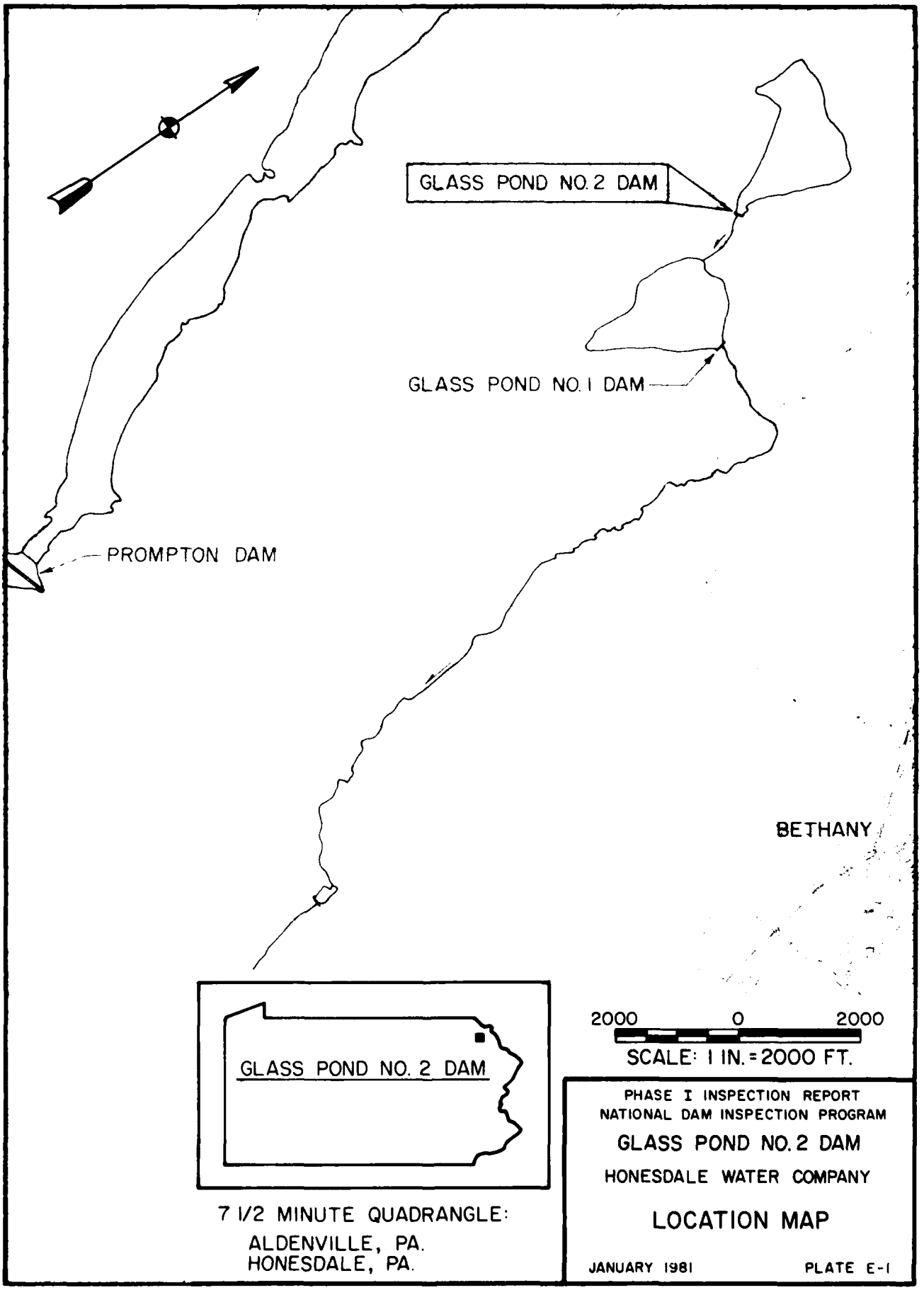
HONESDALE WATER COMPANY

DOWNSTREAM DEVELOPMENT PLAN

JANUARY 1981 EXHIBIT D-1

APPENDIX E

PLATES



7 1/2 MINUTE QUADRANGLE:
ALDENVILLE, PA.
HONESDALE, PA.

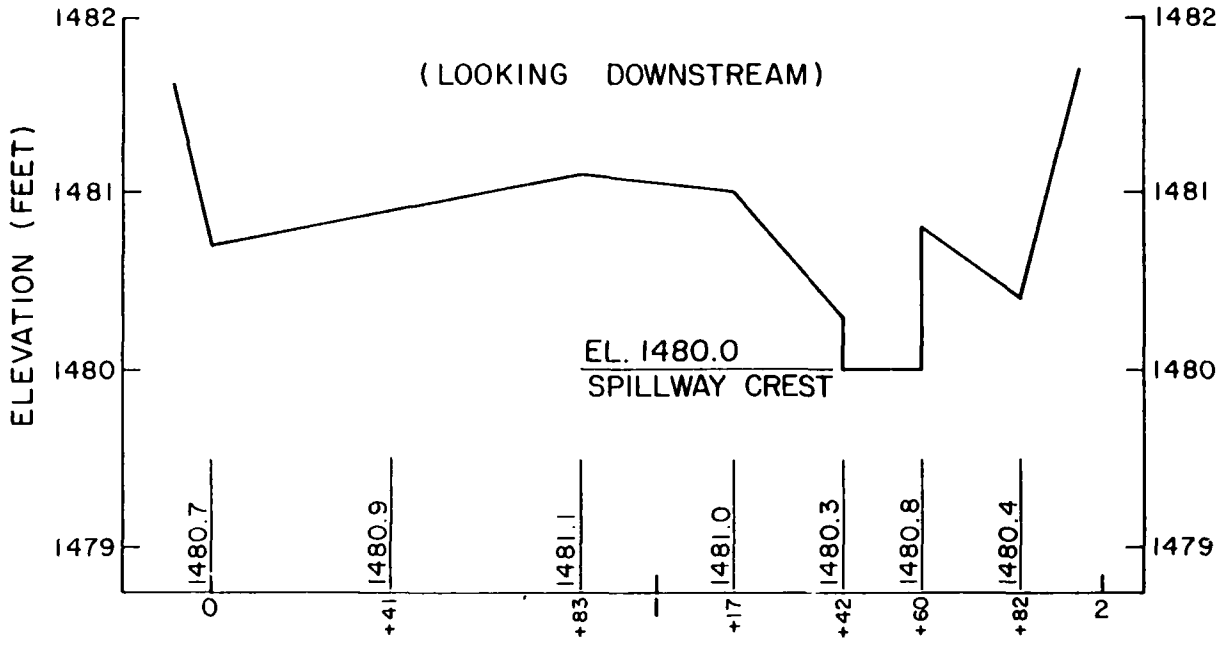
PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

GLASS POND NO. 2 DAM

HONESDALE WATER COMPANY

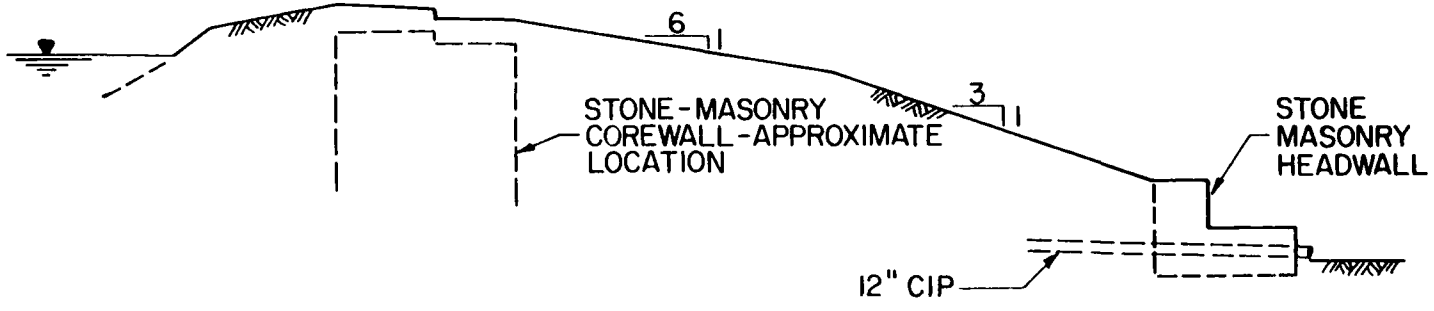
LOCATION MAP

JANUARY 1981 PLATE E-1



PROFILE-TOP OF DAM

SCALE - HORIZ.: 1 IN. = 40 FT.
VERT. : 1 IN. = 1 FT.



EMBANKMENT SECTION AT OUTLET WORKS

SCALE: 1 IN. = 10 FT.

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

GLASS POND NO. 2 DAM

HONESDALE WATER COMPANY

PROFILE AND SECTION

JANUARY 1981

PLATE E-2

APPENDIX F

GEOLOGY

GLASS POND NO. 2 DAM

APPENDIX F

GEOLOGY

Glass Pond No. 2 Dam is located in Wayne County within the Appalachian Plateau Physiographic Province. The most pronounced topographic feature in the area is Camelback Mountain, which is part of the Pocono Plateau Escarpment. The escarpment has a well-defined, southwestward trend from Camelback Mountain, but it is irregular between Camelback Mountain and Mt. Pocono, which lies to the north. Streams east of the escarpment drain directly to the Delaware River, while those to the west drain to the Lehigh River.

The Pocono Plateau Section lies to the west of the escarpment. This area is relatively flat, with local relief seldom exceeding 100 feet. The topography has been greatly influenced by continental glaciation. Many features were created by deposition of glacial materials. The entire plateau lacks well-developed drainage.

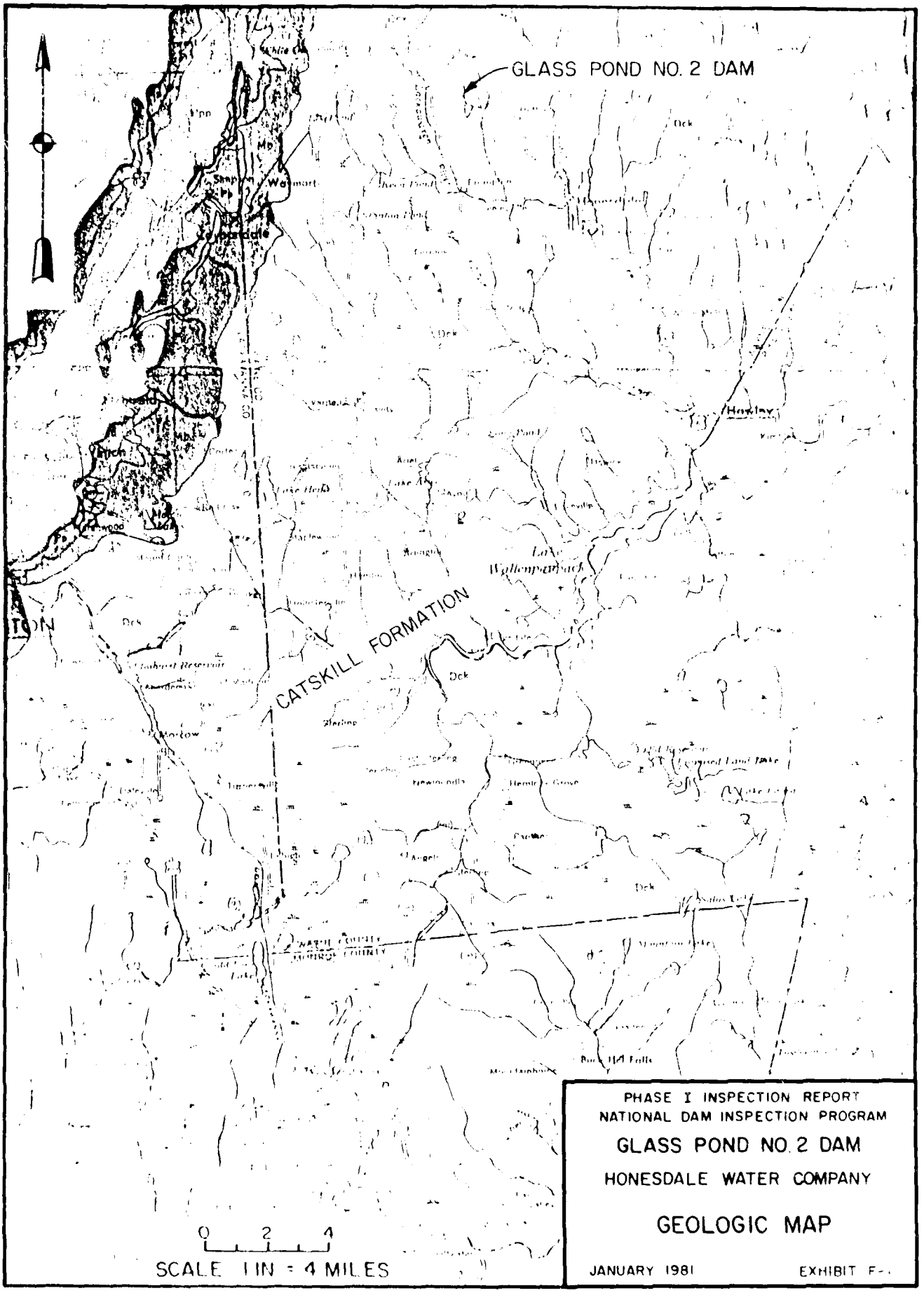
East of the escarpment is the Glaciated Low Plateaus Section of the province. This area is characterized by pre-glacial erosional topography with locally thick glacial deposits. Local relief is generally 100 to 300 feet.

Bedrock units of the sections described above are the lithified sediments of offshore marine, marginal marine, deltaic environments, and fluvial environments associated with the Devonian Period. These units include siltstones of the Mahantango Formation, siltstones and shales of the Trimmers Rock Formation, and seven mapped members of the Catskill Formation. These members include sandstones, siltstones, and shales of the Towamensing Member; sandstone, siltstone and shale of the Walcksville Member; sandstones, siltstones and shale of the Beaverdam Run Member; sandstone and shale in the Long Run Member; sandstones and conglomerates in the Packerton Member; sandstones and some conglomerates in the Poplar Gap Member; and sandstones and conglomerates in the Duncannon Member.

Glass Pond No. 2 Dam is underlain by the Catskill Formation. The Catskill Formation is predominantly red to brownish gray shales and sandstone with interbedded siltstones and conglomerates. Sandstones present are thick-bedded, fine- to coarse-grained and exhibit very low primary porosity due to a clay and silica matrix. Effective porosity results from fractures and parting planes.

The rocks are well-indurated and generally are not susceptible to slope failure; however, the presence of well-developed bedding and joint planes will result in some rockfall from vertical and high-angle cut slopes.

Bedrock is entirely overlain by glacial till of Late Wisconsin Age. This till is an unsorted mixture of clay, silt, sand, and gravel. It is moderately cohesive and is generally derived locally from the sandstones of the Catskill Formation. Thickness of the till varies from 5 to 75 feet.



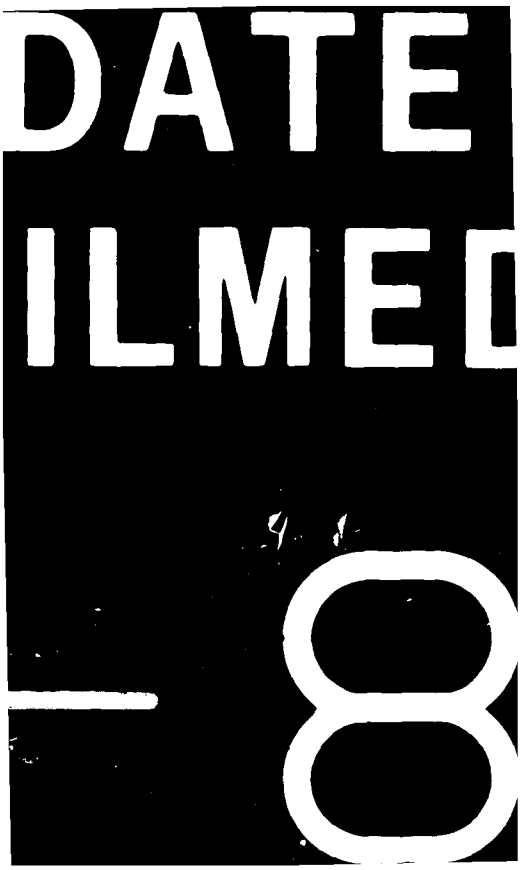
PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

GLASS POND NO. 2 DAM

HONESDALE WATER COMPANY

GEOLOGIC MAP

JANUARY 1981 EXHIBIT F-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